

Other LLNL Accomplishments

Presented at the Nuclear Criticality Safety Program (NCSP) Review, 30 May 2013, Washington, DC

Dave Heinrichs and Chuck Lee
Lawrence Livermore National Laboratory

Other LLNL Accomplishments

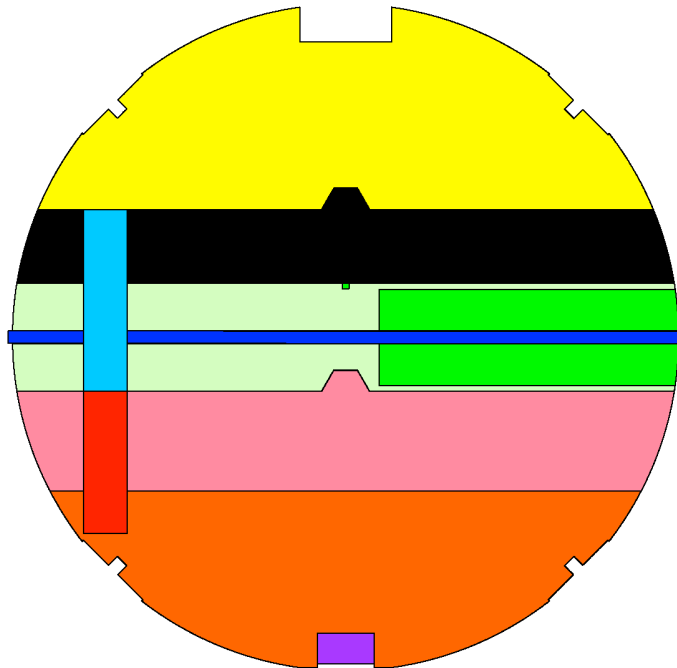
- Analytic Methods
 - COG / ARDRA
 - Automated Data Testing
- IP&D
 - ICSBEP
 - New Classified NCSP Website (ESN)
- T&E
 - Multimedia training modules

Analytic Methods

- COG geometry package included in ARDRA
- Test results shown for OR Sphere

3D Cartesian geometry
160x160x160 mesh
S8 quadrature
87 energy groups
Massively parallel

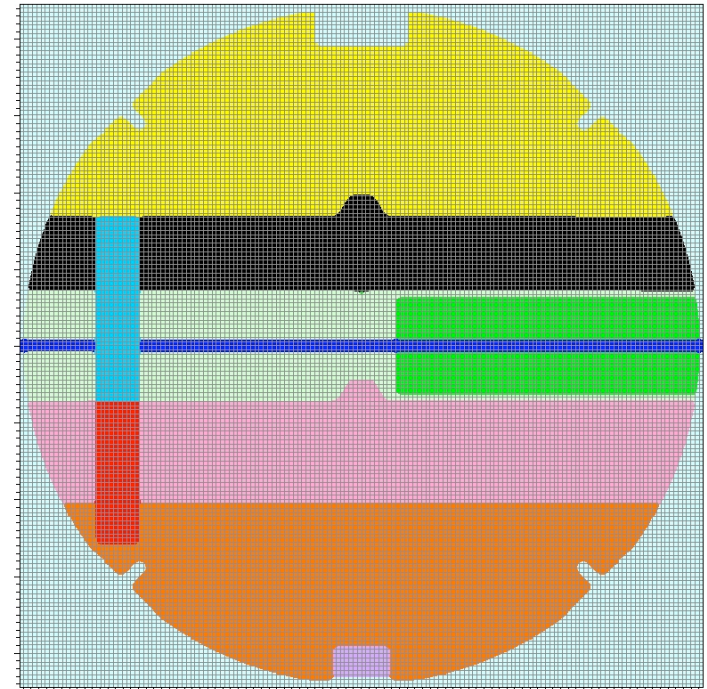
COG



HMF100-1: $k_{eff} = 1.00426(9)$ (ENDF/B-VII.1)
HMF100-2: $k_{eff} = 0.99816(9)$ (ENDF/B-VII.1)



ARDRA

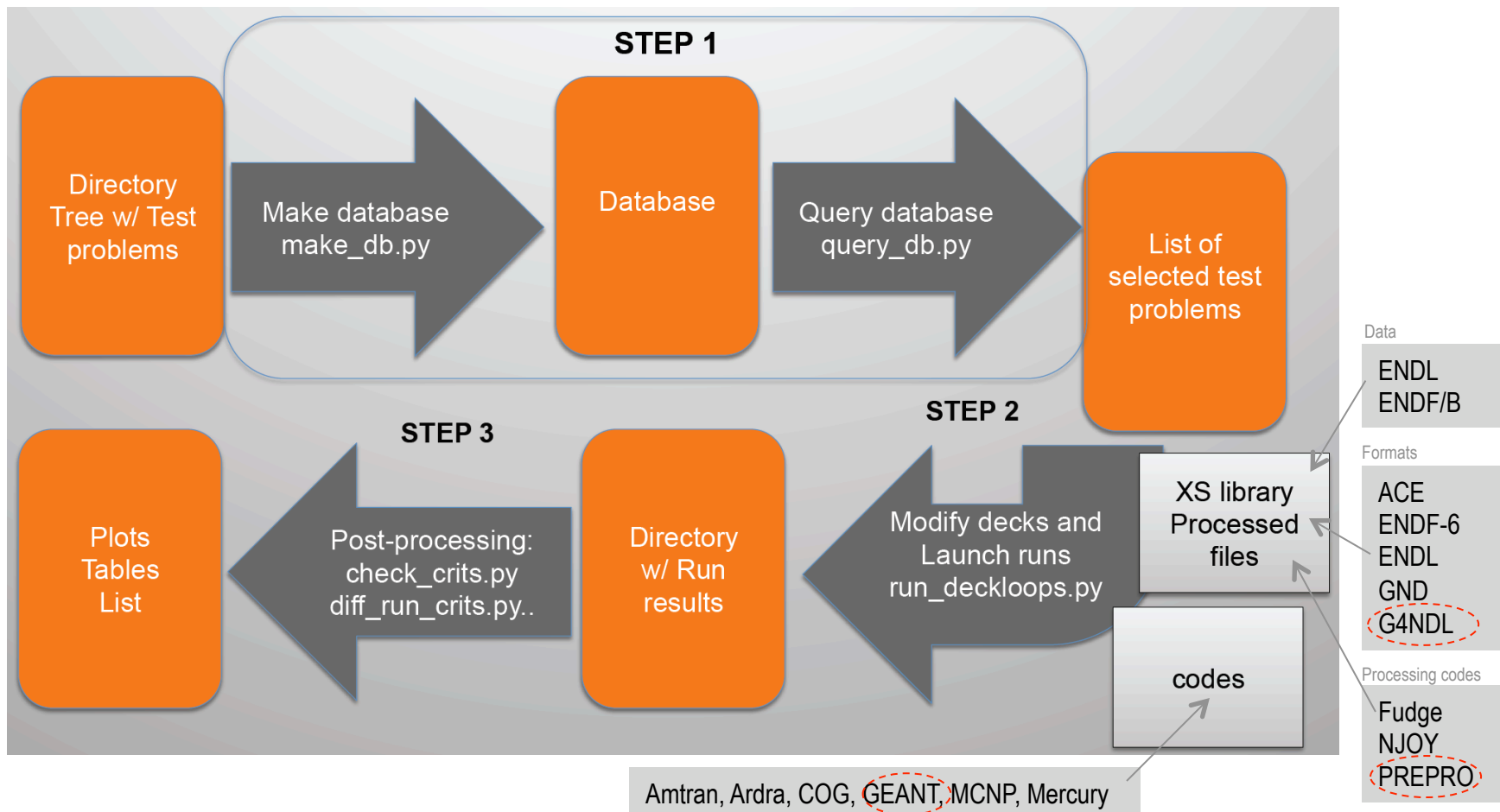


HMF100-1: $k_{eff} = 1.00431$ (ENDL2009.0)
HMF100-2: $k_{eff} = 0.99760$ (ENDL2009.0)



Analytic Methods

- LLNL and BNL are implementing automated V&V
- Presented by Marie-Ann Descalle at ND2013 in NYC



ICSBEP meeting

- Meeting at NEA Headquarters in Paris, May 15-17, 2013
- NCSP participants from LLNL, LANL, VNIITF and Bettis
Heinrichs Favorite Shmakov Zerkel
- 12 ICSBEP Evaluations
 - ◆ 5 NCSP evaluations
 - ◆ 1 NE evaluation
 - ◆ 6 foreign evaluations
 - ◆ 4 IRPhEP evaluations
- NEA will publish a summary record of the meeting as in previous years



ICSBEP meeting – 5 new NCSP evaluations

LEU-COMP-THERM-078

IER-159

Water-Moderated Square-Pitched
U(6.90)O₂ Fuel Rod Lattices with 0.52
Fuel-To-Water Ratio

Dave Heinrichs
For
Gary Harms



HEU-MET-FAST-093

IER-129

Heterogeneous HEU and Molybdenum Cylinder
with Molybdenum Reflector

Nikolay Stepanov,
Marina Chubareva,
and
Vladimir Shmakov



HEU-MET-FAST-094

IER-129

Two Heterogeneous Cylinders of Highly Enriched
Uranium and Molybdenum with Beryllium
Moderator and Depleted-Uranium Reflector

Nikolay Stepanov,
Marina Chubareva,
and
Vladimir Shmakov



HEU-MET-MIXED-020

IER-129

Two Heterogeneous Cylinders of Highly Enriched
Uranium, Polyethylene, and Molybdenum with
Polyethylene Reflector

Nikolay Stepanov,
Marina Chubareva,
and
Vladimir Shmakov







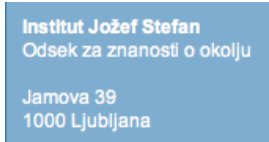


PU-MET-FAST-001
(Major Revision)

Bare Sphere of Plutonium-239 Metal (4.5 at. %
²⁴⁰Pu, 1.02 wt. % Ga)

Jeffrey Favorite



ICSBEP meeting – 7 other evaluations

HEU-MET-FAST-100	ORSPHERE: Critical, Bare, HEU(93.2)-Metal Sphere	Margaret Marshall	
LEU-COMP-THERM-088	Critical Configurations of the IPEN/MB-01 reactor with Heavy Reflectors composed of Carbon Steel and Nickel	Adimir dos Santos	
MIX-MISC-THERM-006 X-Ref: MIX-SOL-THERM-009	Arrays of UO ₂ -PuO ₂ PHENIX Pins Containing 26% of Plutonium (²⁴⁰ Pu/Pu _t =16%) in a Mixed Uranium-Plutonium (Pu/(U+Pu _t)=29.6%, ²⁴⁰ Pu/Pu _t =19%) Nitrate Solution	Gilles Poullot	
PU-SOL-THERM-039	Plutonium Temperature Effect Program - Low Concentrated (20, 15 or 14.3 g/l) Plutonium Nitrate Solutions at Temperatures Varying from 28°C to 40°C	Nicolas LeClaire	
HEU-SOL-THERM-051	Critical Parameters of Enriched ²³⁵ U Solutions in Annular Geometry	Luka Snoj	
MIX-MET-FAST-014 IRPhEP ID: (BFS1-LMFR-EXP-003)	BFS-1 Assembly 85: Experiment for Testing Scattering Cross-Sections of Pb-Bi or Pb	Yevgeny Rozhikhin and Anatoli Tsiboulia	
MIX-MET-FAST-016 IRPhEP ID: (BFS1-LMFR-EXP-004)	BFS-1 Assembly 87: Experiment for Testing Transport Cross-Sections of Pb-Bi or Pb	Yevgeny Rozhikhin and Anatoli Tsiboulia	

ICSBEP meeting – 4 IRPhEP evaluations

HEU-COMP-FAST-001

IRPhEP ID: (SCCA-SPACE-EXP-001)

Critical Configuration and Physics
Measurements for Graphite Reflected
Assemblies of U(93.15)O₂ Fuel Rods (1.27-
cm Pitch)

Margaret Marshall



HEU-COMP-FAST-002

IRPhEP ID: (SCCA-SPACE-EXP-002)

Critical Configuration and Physics
Measurements for Graphite Reflected
Assemblies of U(93.15)O₂ Fuel Rods
(1.506-cm Pitch)

Margaret Marshall



HEU-COMP-FAST-004

IRPhEP ID: (SCCA-SPACE-EXP-003)

Critical Configuration and Physics
Measurements for Beryllium Reflected
Assemblies of U(93.15)O₂ Fuel Rods
(1.506-cm Pitch)

Margaret Marshall



IEU-COMP-THERM-013

IRPhEP ID: (NRAD-FUND-RESR-001)

Fresh-Core Reload of the Neutron
Radiography (NRAD) Reactor with
Uranium(20)-Erbium-Zirconium-Hydride
Fuel

John Bess





Information Preservation & Dissemination (IP&D) A Brief History of the CSBEP, ICSBEP and NCSP



HOME

ICSBEP Handbook
- History

UPDATED

- Peruse Handbook on-line
- Download or burn a DVD image
- Request a DVD by mail
- Password request

ICSBEP Database (DICE)

- DICE User's manual
- DICE software

NEW

2012 New Evaluations
2013 New Evaluations

Integral Experiments
Request (IER)

DOE Nuclear Criticality
Safety Program

International Reactor
Physics Evaluation Project

Partners

- OECD
- NEA
- CEA-Valduc
- IRSN
- VNIITF
- WPNCNS



Mr. Dae Chung
Principal Deputy
Assistant Secretary
United States
Department of Energy

In 1992, the Criticality Safety Benchmark Evaluation Project (CSBEP) was founded under the auspices of US DOE Office of Defense Programs by Mr. Dae Chung with criticality safety experts participating from across the US DOE Complex:

- Argonne National Laboratory
- Bettis Atomic Power Laboratory
- Hanford
- Idaho National Laboratory
- Lawrence Livermore National Laboratory
- Los Alamos National Laboratory
- Oak Ridge National Laboratory
- Pacific Northwest National Laboratory
- Sandia National Laboratories
- Rocky Flats Plant
- Savannah River National Laboratory
- Y-12 Plant



Dr. Jerry McKamy
Manager
Nuclear Criticality
Safety Program
Director
Facilities Operations Division
United States
Department of Energy

In 1994, the CSBEP welcomed its first international participants from France, Hungary, Japan, the Russian Federation, and the United Kingdom.

In 1995, to further enhance international participation, the DOE allowed the CSBEP to become an official activity of the Organization for Economic Cooperation and Development (OECD), Nuclear Energy Agency (NEA), Working Party on Nuclear Criticality Safety (WPNCNS), and the name was changed to the International Criticality Safety Evaluation Project (ICSBEP).

In 1997, the Nuclear Criticality Safety Program (NCSP) was formally established by DOE under the auspices of the Office of Defense Programs.

Today, the ICSBEP remains an important element of the US DOE NCSP as described by Dr. Jerry McKamy in the NCSP *Mission and Vision*. Current NCSP activities including ICSBEP participation are described in the *Five-Year Execution Plan*.

Page contact: Chuck K. Lee, lee12@llnl.gov.

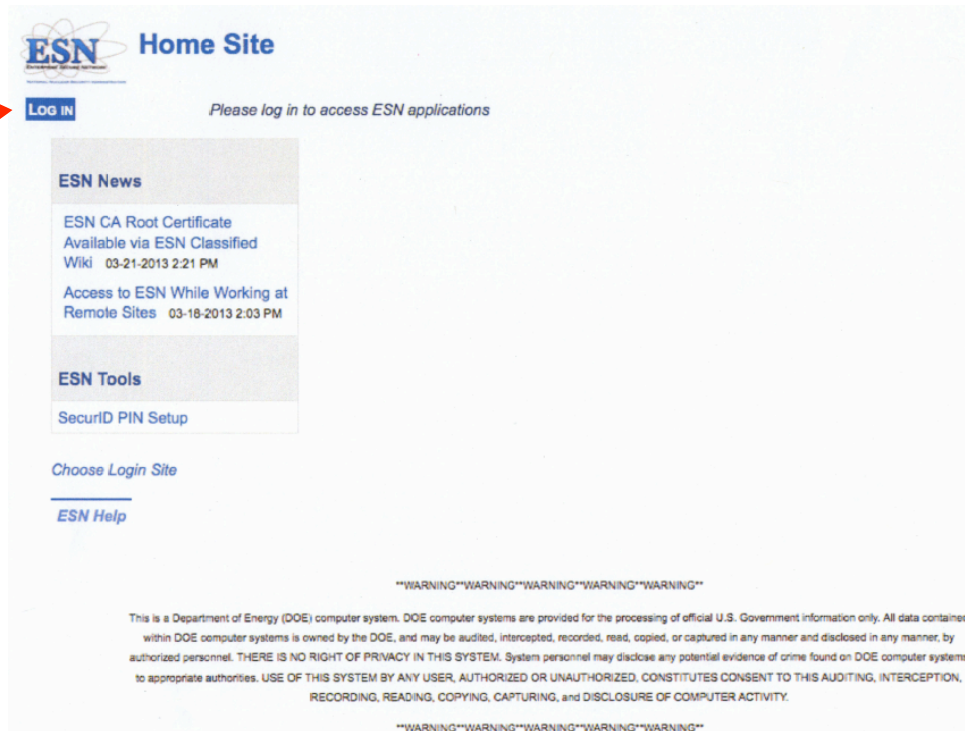
The [Lawrence Livermore National Laboratory](#) maintains this website.

Updated: Monday, May 6, 2013

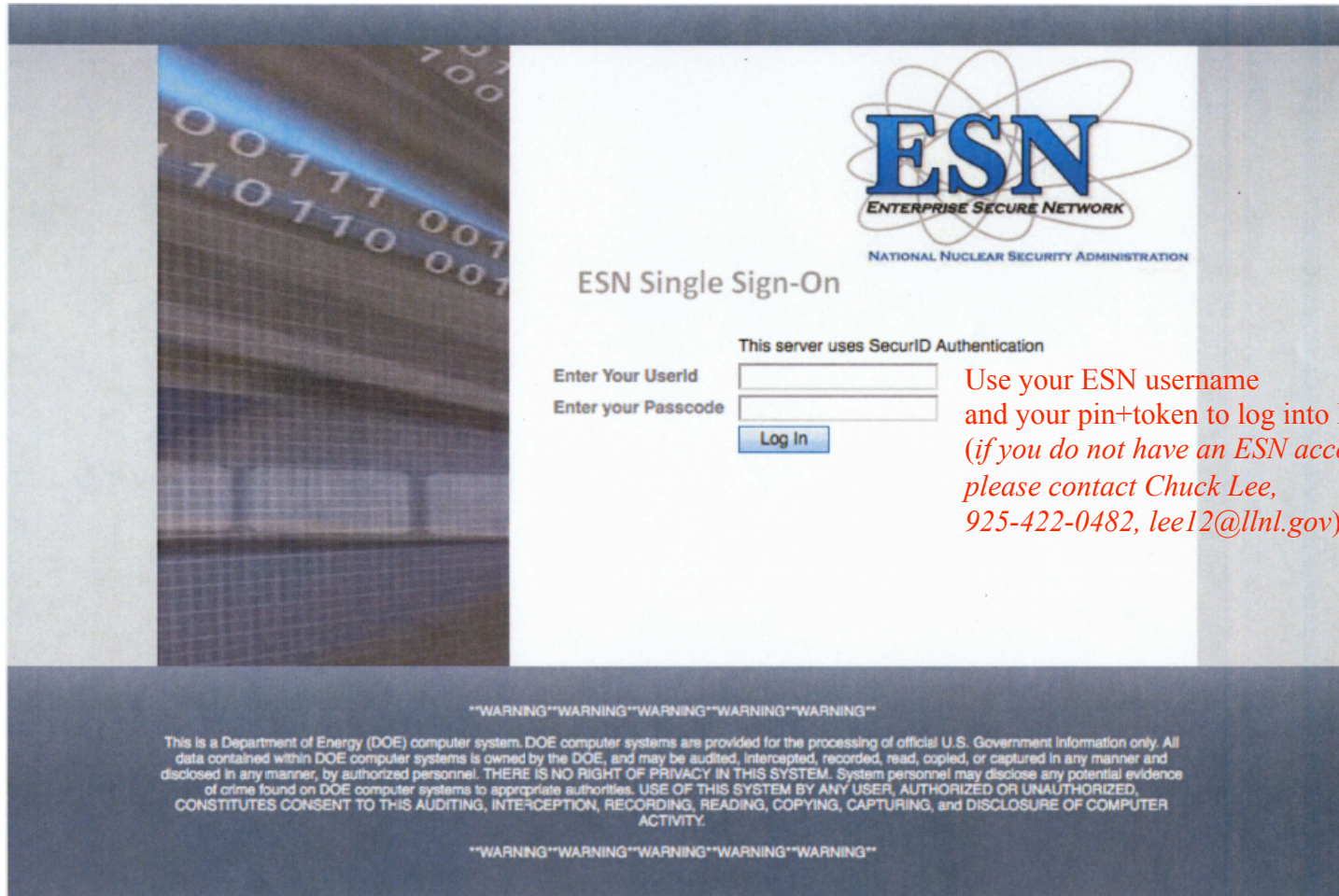
NCSP Classified Website

- **Step 1:** Contact Chuck Lee, (925) 422-0482, lee12@llnl.gov, to obtain an ESN user account
- **Step 2:** On your classified computer, using your web browser, go to <https://www.central.esn.gov/wiki/display/ehs/Home+Site>

Click the LOG IN
button to log in to access
the classified NCSP website



NCSP Classified Website -Continue



The screenshot shows the ESN Single Sign-On login page. On the left is a vertical banner with a blue and white digital pattern of binary code. The main content area has a white background. At the top right is the ESN logo, which consists of the letters 'ESN' in a large, blue, serif font, with 'ENTERPRISE SECURE NETWORK' in a smaller, black, sans-serif font below it. Underneath the logo is the text 'NATIONAL NUCLEAR SECURITY ADMINISTRATION'. The title 'ESN Single Sign-On' is centered. Below the title, it says 'This server uses SecurID Authentication'. There are two input fields: 'Enter Your UserId' and 'Enter your Passcode'. A blue 'Log In' button is positioned below the passcode field. To the right of the login fields, there is a red text block providing instructions and contact information. At the bottom of the page, there is a dark blue footer containing a series of asterisks and the word 'WARNING' repeated five times, followed by a paragraph of legal disclaimer text.

ESN
ENTERPRISE SECURE NETWORK
NATIONAL NUCLEAR SECURITY ADMINISTRATION

ESN Single Sign-On

This server uses SecurID Authentication

Enter Your UserId

Enter your Passcode

Use your ESN username
and your pin+token to log into ESN
(if you do not have an ESN account
please contact Chuck Lee,
925-422-0482, lee12@llnl.gov)

WARNINGWARNING***WARNING***WARNING***WARNING***

This is a Department of Energy (DOE) computer system. DOE computer systems are provided for the processing of official U.S. Government information only. All data contained within DOE computer systems is owned by the DOE, and may be audited, intercepted, recorded, read, copied, or captured in any manner and disclosed in any manner, by authorized personnel. THERE IS NO RIGHT OF PRIVACY IN THIS SYSTEM. System personnel may disclose any potential evidence of crime found on DOE computer systems to appropriate authorities. USE OF THIS SYSTEM BY ANY USER, AUTHORIZED OR UNAUTHORIZED, CONSTITUTES CONSENT TO THIS AUDITING, INTERCEPTION, RECORDING, READING, COPYING, CAPTURING, and DISCLOSURE OF COMPUTER ACTIVITY.

WARNINGWARNING***WARNING***WARNING***WARNING***

NCSP Classified Website -Continue



Home Site

[LOG OUT](#)

Welcome Chuck !

ESN News

ESN CA Root Certificate
Available via ESN Classified
Wiki 03-21-2013 2:21 PM

Access to ESN While Working at
Remote Sites 03-18-2013 2:03 PM

ESN Tools

ESN Phonebook
AM Test

[ESN Help](#)

Display ESN Applications by Selecting a Category:

Administration APS Suite **All Apps** Collaboration Design Manufacturing
Operations PRIDE Research Surveillance Utility Workflow & Reporting

Application Name	Description
Application Registry	<p>Application Registry is used to submit, review, and maintain information about ESN-enabled applications. Information from Application Registry is used to populate the ESN Home Site. Application Registry also supports Need-To-Know (NTK) by collecting data about Information Collections that associate with applications. This information links with ERAMS as part of NTK support.</p> <p><i>Displayed in Categories: Utility, Administration</i></p> <p><i>Hosting Site: IARC access info</i></p>
NCSP	<p>The classified website of the US DOE Nuclear Criticality Safety Program (NCSP) managed by Dr. Jerry N. McKamy, NNSA, NA-162. This website disseminates and preserves classified administrative, technical and operational programmatic information. The website also includes an Integral Experiment Request (IER) web-based application for proposing, designing, executing and documenting classified critical and subcritical experiments performed at the National Criticality Experiments Research Center (NCERC) to assist those responsible for criticality safety to sustain, enhance, and continually improve performance in support of safe, efficient fissionable material operations.</p> <p><i>Displayed in Categories: Operations</i></p> <p><i>Hosting Site: LLNL access info</i></p>

Click on the NCSP
link to access
classified NCSP
website

T&E Multimedia NCSET Modules




- LLNL completed 2 of 3 multimedia conversions of NCSET Module 8, Part I, Hand Calculations:

DOE/NSA Criticality Safety Course:
Hand Calculation and Computational Methods

Buckling/Shape Conversion Method

Mark Lee
Nuclear Criticality Safety Engineer
DOE/NSA Livermore Site Office

NCSP: Nuclear Criticality Safety Program
Buckling/Shape Conversion Method
K - Infinity Method
Surface Density Method
Other Methods to come ...

Click on Next

Resource Help Mark Lee Introduction Next

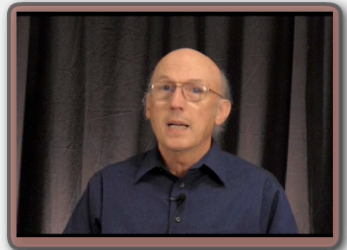


[http://ncsp.llnl.gov/ncset/Criticality Buckling Method/player.html](http://ncsp.llnl.gov/ncset/Criticality_Buckling_Method/player.html)

DOE/NSA Criticality Safety Course:
Hand Calculation and Computational Methods

Surface Density Method

James A. Morman, Ph.D.
Argonne National Laboratory
Criticality Safety Section

Background:
ZPR-6, -9 critical experimenter/analyst
Chair of ANL NCS committee
Member ANS NCSD Education Committee Chair
ANSI/ANS-8.26 training standard
Charter member of DOE NCSP CSSG

Resources Help Jim Morman Introduction Next

[http://ncsp.llnl.gov/ncset/Criticality Surface Density/player.html](http://ncsp.llnl.gov/ncset/Criticality_Surface_Density/player.html)

- Looking forward to your feedback!

